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ELICITATION OF "CHILDHOOD MEMORIES" IN HYPNOSIS-LIKE SETTINGS IS ASSOCIATED WITH COMPLEX PARTIAL EPILEPTIC-LIKE SIGNS FOR WOMEN BUT NOT FOR MEN: IMPLICATIONS FOR THE FALSE MEMORY SYNDROME [1]

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Summary.—20 male and 20 female undergraduate students were exposed singly for 20 min. to an exotic setting (partial sensory deprivation and weak, bilateral transtemporal pulsed magnetic fields) that enhances relaxation and exotic experiences. The numerical incidence of subjective experiences described as old memories, dreams, emotions, or vestibular sensations did not differ significantly between the sexes; however, women who reported a greater prevalence of preexperimental complex partial epileptic-like signs were more likely to report experiences of "old memories" ($r = 0.61$) while men who exhibited these signs were more likely to report dream-like ($r = 0.49$) experiences. Because complex partial epileptic-like signs are positively associated with suggestibility, the potential contribution of this differential gender effect to the etiology of the False Memory Syndrome requires further investigation.

The putative "unocclusion" of childhood memories during hypnosis or other altered states has been considered an inference for the existence of Freudian repression. Unchallenged acceptance of this supposition has contributed to the belief that such memories, often suddenly experienced during hypnosis, are valid (Wakefield & Underwager, 1992). Despite repeated experimental evidence that pseudomemories can be created by the therapist if the patient is suggestible, in crisis, or highly dependent (Laurence & Perry, 1983), many clinicians still accept the total validity of hypnosis-elicited childhood memories. Other researchers (Loftus, 1993) have argued that "regression hypnosis" generates an iatrogenic effect; False Memory Syndrome (FMS) has been employed as the provisional label for these consequences and implies both predisposing and precipitating factors.

According to preliminary data that have been published within the newsletter of the FMS Foundation (Philadelphia, PA) women are approximately nine times more likely than men to develop this syndrome. Once it occurs, the person often accuses family members of countercultural behaviors (sexual, incestual, or Satanic ritual abuse), detaches from the family, and exhibits a "different" personality. These women are often between the ages of 25 and 45 years and are usually being treated for mild depression (or anxiety) when the childhood memories of alleged incestual sexual activity suddenly

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occur. Compared to the national average, these women are well educated (university or postgraduate degrees). According to parental reports these young adults, when they were children, were often lonely with persistent mild anxiety or sadness, imaginative (highly creative), and inclined to prefer fantasy; although these children felt "they were different," they achieved above-average grades in high school. Before the therapy and the "unocclusion of old memories," these patients were mildly depressed and frustrated by disappointments concerning job expectations, marriage, or personal relationships.

This collection of symptoms, although compatible with the multidimensional consequences of elevated electrical activity within the mesiobasal temporal lobes (Persinger & Makarec, 1993), is based upon *post hoc* interviews with parents and may not necessarily constitute a valid syndrome. [Syndromes are usually defined by the reliable and statistically significant intercorrelations between the quantitative incidence of symptoms and signs and may be considered the clinical equivalent of a psychometric factor.] The empirical associations between these domains of behavior have not been examined closely and baseline (or normative) data concerning the occurrence of the subjective experiences, neurocognitive correlates, and themes that accompany the therapeutic "release" of childhood memories within nonbiased clinical settings have not been collected.

We (Persinger, Koren, Makarec, Richards, & Youlton, 1991) have found that subjects exposed to 1 sec. on-4 sec. off pulsed magnetic fields across the temporal lobes while wearing opaque goggles and sitting in a comfortable chair within an acoustic chamber report enriched, vivid, and meaningful experiences; they include dreams, old memories, detachment of self (from the body), and profound emotions. Our working assumption is that a significant population of temporal lobe neurons, normally committed to registering background acoustic information, is recruited to amplify the "internal neuroelectrical noise," i.e., thoughts, of the person while the applied magnetic fields act as zeitgebers to maintain these transient neuronal arrays. Subjects describe these "chamber" experiences with words whose emotional meanings are more extreme along the Whissell dimensions (Whissell, Fournier, Pelland, Weir, & Makarec, 1986) of both pleasantness and activity (Richards, Persinger, & Koren, 1993), present as more suggestible to postexposure innuendo, and profess the type of "self-insight" that often follows introspective therapies.

If a reliable relationship exists between complex partial epileptic-like signs and the experiences of cognitions that are similar to and are attributed to memories, then a politically biased therapist could induce more than single pseudomemories because there are repeated verbal instructions over multiple sessions. Suggestions that the patient was sexually abused or abducted

by alien beings as a child or lived a previous life (reincarnation) could inadvertently encourage the labelling of these images and experiences as actual memories. Personality variables and recent life stresses, particularly those that encourage mild depression and ambiguities of self-identity, would increase the risk of experiencing such convictions.

The present experiment was designed to discern if there were significant quantitative associations between symptoms that would support the existence of a "syndrome." If the results of the questionnaire data collected from the families of patients who allegedly displayed False Memory Syndrome were valid, then (1) there should be a statistically significant association between experiences that are attributed to "old memories" and complex partial epileptic-like signs for women and (2) men, although their absolute incidence of subjective experiences or complex partial epileptic-like signs should be comparable to that of women, should exhibit significant associations between complex partial epileptic-like signs and other forms of experiences. Intercorrelations between variables have often exhibited important sexual heterogeneity (Persinger, 1991a; Persinger & Richards, 1991; Skirda & Persinger, 1993) but without statistically significant gender differences for mean values. For example, although men and women are equally suggestible, the statistically significant positive correlations between the numbers of complex partial epileptic-like signs and either Spiegel's hypnosis induction profile (Persinger & DeSano, 1986) or fantasy proneness (Makarec & Persinger, 1987) are most prominent for normal women.

Method

To test this hypothesis 20 men and 20 women between the ages of 18 and 23 years served as subjects. They were enrolled in first-year psychology courses and received 2% bonus marks for participation. Each subject had been administered the Personal Philosophy Inventory (Persinger & Makarec, 1987) about two weeks before the experiment; items that constituted the major clusters: control (for "yes" responding), complex partial epileptic-like signs, interictal-like behaviors, and temporal lobe-relevant signs (Persinger & Makarec, 1987, 1993) had been extracted from the inventories. Clusters of items that reflect conservative religious beliefs and exotic, e.g., reincarnation, UFOs are alien intelligence, beliefs as well as those that represent anxiety-phobia (Persinger & Makarec, 1991) were also obtained.

On the day of the experiment each subject (not more than two were tested per day) was asked to sit quietly in an acoustic chamber and was told that the procedure was an experiment in relaxation. The subject wore goggles and a modified motorcycle helmet through which 10-milligauss (1 micro-Tesla) magnetic fields were applied through the temporal plane. Except for a weak red (photographic developing) light, the room was dark (see Richards, *et al.*, 1993). The experienced female technician who interacted with the

subjects was not familiar with the hypothesis or the purpose of the testing (double-blind procedure).

After 20 min., the chamber's dim white lights were activated, the goggles were removed, and the subject was asked to complete (immediately) an exit questionnaire which contained 20 (0 = never, 1 = at least once, 2 = frequently) items that reflected the major phenomenology of unusual states as well as their perceptual characteristics (Persinger, *et al.*, 1991). The means for each of four clusters (two or three items each) were extracted for the present study: emotions (anger, fear, sadness), vestibular experiences (vibrations, spinning, dizziness), childhood memories, and dream-like images. Comparisons between men and women were completed by one-way analyses of variance. First-order correlations and partial correlations (controlling for potential nonspecific effects such as "yes" responding) were examined. To accommodate individual baseline differences for the frequency of the report of the chamber experiences, relative scores for the four clusters were completed by dividing each cluster score by the mean for all 20 items.

Results

One-way analyses of variance yielded no statistically significant (all *df*s = 1,38, $p > .05$) differences between men and women for the chamber experiences or subclinical epileptic indicators. Means, with standard deviations in parentheses, were for emotions 0.39 (0.47), vestibular experiences 0.64 (0.50), old memories 0.75 (0.57), dreams 0.77 (0.52), complex partial epileptic-like signs 29% (17%), interictal-like signs 31% (15%), temporal lobe-relevant indicators 44% (13%), control indicator (for "yes" responding) 76% (13%), exotic beliefs 57% (22%), and religious beliefs 58% (22%). The women reported significantly more ($F_{1,38} = 12.12$, $p < .01$) fear or phobic experiences [56% (19%)] than the men [34% (20%)]

However, men and women exhibited differences in which chamber and subclinical epileptic-like variables were significantly associated. The Spearman correlation coefficients between the clusters derived from the Personal Philosophy Inventory and the scores for items that reflected the subjective experiences within the chamber are shown in Table 1. Even when the variance associated with the control cluster was held constant, the men showed no significant change between a history of complex partial epileptic-like signs and the experience of memories within the exotic setting (partial $r = 0.24$) while the correlation between complex partial epileptic-like signs and the experience of dreams remained statistically significant (partial $r = 0.38$, $p < .05$). When the control cluster was held constant for the women, only the correlation (partial $r = 0.73$, $p < .001$) between complex partial epileptic-like signs and the experience of childhood memories remained significant (partial r between seizure-like signs and dreams = 0.28).

The largest sex difference between correlation coefficients [complex par-

tial epileptic-like signs and childhood memories ($rs = 0.60$ and 0.20 for men and women, respectively)] was not statistically significant ($z = 1.43$). A sample size of 60 would have been required to reach traditional criterion. There were no significant sex differences between men and women ($F < 1.00$) for the relative frequency of reports of either dreams or old memories within the chamber. After covarying for scores on the control cluster, the association between the relative strength of old memories compared to all other experiences in the chamber and subclinical seizure-like signs was still significant for the women (partial $r = 0.42$, $p < .01$); a statistically significant association between old memories and scores on the fear and phobia cluster (partial $r = 0.45$) emerged. The association, however, between the relative strength of incidence of dream-like experiences and complex partial epileptic-like signs for the men was no longer significant (partial $r = 0.17$).

TABLE 1
SPEARMAN COEFFICIENTS BETWEEN TEMPORAL LOBE INDICATORS AND EXPERIENCES WITHIN AN EXOTIC SETTING FOR MEN AND WOMEN

Variable	Complex Partial Epileptic-like Signs	Interictal-like Signs	Temporal Lobe-relevant Indicators	Exotic Beliefs	Religious Beliefs	Fears and Phobias
			Men			
Emotion	−.18	−.02	.06	−.05	.25	.23
Vestibular	.31	.19	.18	−.04	.29	.09
Child Memory	.21	.25	.01	−.17	.11	.11
Dream	.49*	.11	.20	−.13	.02	.31
			Women			
Emotion	.47*	.17	.23	−.12	−.18	−.07
Vestibular	.58†	.30	.19	−.25	.05	−.17
Child Memory	.61†	.26	.24	.02	−.02	.31
Dream	.29	.05	.13	.15	−.06	.01

*$p < .05$. †$p < .01$.

Additional correlations were completed (to address specific questions by referees) between a "more-to-life" factor (primarily dominated by affirmative responses to items such as "there must be something more to life" and "criticism and scolding hurt me terribly"), the chamber experiences, and the subclinical partial epileptic-like signs. This analysis was completed to test the hypothesis that emotional sensitivity and dissatisfaction with one's status could encourage attribution of stimulated (intensified) experiences to old memories because orientation towards the past (memory) would be less anxiogenic than focus upon the present or future.

There were no significant sex differences ($F < 1.00$) in the mean scores for this scale. Scores for the numbers of epileptic-like signs, the more-to-life factor, and the incidence of old memories and dreams were not intercorre-

lated significantly for the men. Women, however, exhibited a significant association between the numbers of old memories and scores for the more-to-life factor ($rho = 0.45$, $p < .05$; when seizure-like signs were held constant the partial $r = 0.48$, $p < .05$); the association between this factor and seizure-like signs was not significant ($rho = 0.10$). After removing the shared variance with the more-to-life factor, the partial correlation between subclinical (temporal) epileptic-like signs and the numbers of old memories experienced in the chamber was 0.73 ($p < .001$).

Discussion

If these results are generalizable to the population, then women who are prone to experiences they attribute to childhood memories should also reflect the characteristics that have been empirically associated (Persinger & Makarec, 1987, 1993) with elevations in complex partial epileptic-like signs. During periods of productivity, such women would be more fantasy-prone, suggestible, and creative. During disruptions in expectation, they would be more inhibited and anxious (e.g., submissive and compliant before authority), disillusioned, suspicious and aloof, dissociative, and intellectually ruminative. An above-average incidence of subjective false pregnancy and a history of a sensed presence (primarily along the left side) would be expected. These women would also display an enhanced desire for social affiliation (identity) with peer groups and be prone to "conversion energy," i.e., a desire to convert others, following shifts in self-definition. The ratio of Roman Catholics to Protestants should be about 8:1 (Persinger, 1991b).

People who present "clinical" symptoms within psychotherapeutic contexts exhibit symptoms that are simply more quantitatively extreme and temporally persistent than the average person. Men and women who display behaviors that are compatible with False Memory Syndrome should also exhibit similar symptoms whose intensities would be conspicuous. This conclusion assumes that the regression equation is not invalidated by an unforeseen restricted range problem within the correlational analyses.

In this study neither the specific details of the childhood memories nor their validity were assessed. Consequently one cannot judge whether the experiences were memories or dreams or were merely *attributed* to memories and dreams. Unless one assumes that men who display elevated complex partial epileptic-like signs are more likely to experience fragments from dreams while women with this history are more likely to experience childhood memories, the more parsimonious explanation would demand a sex-specific attribution of experiences that were neither dreams nor memories but simply experiences evoked by the exotic setting. A moderate positive correlation between complex partial epileptic-like signs and endorsement of exotic beliefs (e.g., reincarnation, spiritualism) but not conservative religious beliefs has been shown for women but not for men (Skirda & Persinger, 1993).

If subsequent experiments suggest these experiences are valid, then clinically relevant, sexual dimorphic brain organization would be implied. Such an intrinsic difference in limbic organization between men and women has been suggested by Remillard, Andermann, Testa, Gloor, Aube, Martin, Feindel, Guberman, and Simpson (1983). A continuum of temporal lobe sensitivity (Persinger & Makarec, 1993) in conjunction with sexual dimorphism in the brain would predict that nonepileptic women who display elevated complex partial epileptic-like signs should experience more sexual content within these "old memories." This association should be less evident in men who display elevated complex partial epileptic-like signs (or would be attributed to "dreams").

Behavioral awareness primarily involves strongly linguistic and traditionally left hemispheric processes. If the normal woman exhibits marginally greater electrical homogeneity (less lateralization) of the temporoparietal regions and more linguistic representation in the nondominant (right) hemisphere (Reite, Cullum, Stocker, Teale, & Kozora, 1993), then processes (such as exotic settings or hypnosis) which encourage intercalation between the hemispheres could enhance intrusions of these experiences into left hemispheric awareness (Persinger, 1993). Whereas normal men, who are more lateralized, might experience "dreams," normal women might access representations of earlier experiences.

Considering the suspected prevalence of coding errors, ontogenetic (Piagetian) shifts in cognitive patterns and the fact that autobiographical memory is a complex referencing process driven by a *reconstruction of events* rather than by rote sequencing of events (such as remembering a multiplication table), the content validity of these experiences would still be ambiguous. If our hypothesis (Richards, *et al.*, 1993) concerning affective dimensions of consciousness were correct, then the pleasantness-unpleasantness of these intrusions would be valid while their specific cognitive content (implicit verbal chains for both attribution and cause) would be determined by demand characteristics, expectancies, and the contemporary repertoire of linguistic symbols. Stated simply, the emotions of the "memory" would be valid while their causes would be inaccurate or subject to alteration by suggestion.

The phenomenological characteristics of "unrepressed memories" as well as the experiences that are generated within our experimental setting indicate primary involvement of the major neuroanatomical pathway for episodic memory: prefrontal cortical, mediodorsal (thalamic), and amygdaloid-hippocampal circuits. There is now compelling evidence, succinctly stated by Horowitz and Adams (1970), that elevated deep temporal lobe lability simply enhances the intensity of the ongoing cognitive process. Images evoked by words and metaphors, especially if they are repeated over sessions, would approach the characteristics of normal perceptions and consequently could be consolidated as if they actually occurred.

The inhibitory functions of the prefrontal cortices are critical for discriminating between the memories of experiences normally produced by external objects or events and those induced by the vivid images evoked by words and metaphors. Behavioral correlates of mild prefrontal dysfunction, such as psychological depression or anxiety, in conjunction with complex partial epileptic-like signs would summate to intensify the vividness of the language-evoked imagery and to attenuate the person's capacity to differentiate between the memory of this imagery and the memory of actual events. Because the reconstructive property of normal prefrontal function is critical for the reiteration of the precise *temporal order* of experiences (a condition necessary for accurate autobiographical memory), the attribution of "when" the experience occurred could be distorted. The perceived validity of the experiences would be intensified by both the consequences of reinforcement and the maintenance of the new cognitive structure by the therapist (Persinger, 1992).

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